

#### ABSTRACT

The generation of ultrabright, multikilovolt coherent tunable x-radiation resulting from amplification on hollow atom transition arrays is described. Amplification has been demonstrated by physical evidence including (a) the  
5 observation of selected spectral components of several  $\text{Xe}^{q+}$  hollow atom transition arrays ( $q = 30, 31, 32, 34, 35, 36, 37$ ) radiated axially from confined plasma channels, (b) the measurement of line narrowing that is spectrally correlated with the amplified transitions, (c) evidence for spectral hole-burning in the spontaneous emission, a manifestation of saturated amplification, that corresponds spectrally  
10 with the amplified lines, and (d) the detection of an intense narrow ( $\delta\theta_x \sim 0.2 \text{ mr}$ ) directed beam of radiation in the far field of the source.